

The effect of credit risk management and bank-specific factors on the financial performance of the South Asian commercial banks

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Abstract

Purpose – Among all of the world's continents, Asia is the most important continent and contributes 60% of world growth but facing the serving issue of high nonperforming loans (NPLs). Therefore, the current study aims to capture the effect of credit risk management and bank-specific factors on South Asian commercial banks' financial performance (FP). The credit risk measures used in this study were NPLs and capital adequacy ratio (CAR), while cost-efficiency ratio (CER), average lending rate (ALR) and liquidity ratio (LR) were used as bank-specific factors. On the other hand, return on equity (ROE) and return on the asset (ROA) were taken as a measure of FP.

Design/methodology/approach – Secondary data were collected from 19 commercial banks (10 commercial banks from Pakistan and 9 commercial banks from India) in the country for a period of 10 years from 2009 to 2018. The generalized method of moment (GMM) is used for the coefficient estimation to overcome the effects of some endogenous variables.

Findings – The results indicated that NPLs, CER and LR have significantly negatively related to FP (ROA and ROE), while CAR and ALR have significantly positively related to the FP of the Asian commercial banks.

Practical implications – The current study result recommends that policymakers of Asian countries should create a strong financial environment by implementing that monetary policy that stimulates interest rates in this way that automatically helps to lower down the high ratio of NPLs (tied monitoring system). Liquidity position should be well maintained so that even in a high competition environment, the commercial is able to survive in that environment.

Originality/value – The present paper contributes to the prevailing literature that this is a comparison study between developed and developing countries of Asia that is a unique comparison because the study targets only one region and then on the basis of income, the results of this study are compared. Moreover, the contribution of the study is to include some accounting-based measures and market-based measures of the FP of commercial banks at a time.

Keywords South Asian countries, Credit risk, Bank-specific factors, Generalized method of moment

Paper type Research paper



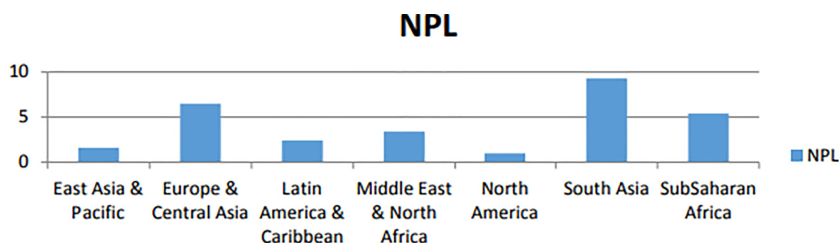
Introduction

Around the globe, depository institutions perform a crucial job in bringing financial stability and economic growth by mobilizing monetary resources across multiple regions (Accornero *et al.*, 2018). The commercial plays an intermediary role by collecting the excessive amount from savers and issuing loans to the borrowers. In return, banks can earn a high interest rate (Khan *et al.*, 2020; Ghosh, 2015). Banks tried to increase their financial performance (FP) by issuing loans while playing their intermediary role; banks have a high chance of facing credit risk. Accornero *et al.* (2018) found that the country's banking industry mostly collapses due to high credit risk. Sometimes, it leads to the failures of the whole financial system. Credit risk is expected to be arises when a borrower cannot meet their obligation about future cash flows. Commercial banks' FP is affected by two factors: one is external and the other is internal. Bank-specific factors are internal and able to control factors of the commercial banks. Ofori-Abebrese *et al.* (2016) pointed out that adverse selection and moral hazards were created due to mismanagement of internal factors. The abovementioned financial problems are turmoil period in the banking/financial sector.

Among the entire continent of the world, Asia is the most crucial continent and contributing 60% of world growth but facing the serving issue of high nonperforming loans (NPLs). It is well known that a high ratio of NPLs weakens the economy or country's financial position. The growth level in South Asia was the highest in 2015, and the ratio is 9.3%, which is the highest among all continents. According to the Asian Development Bank (2019), the NPLs in the south are approximately \$518bn, which is relatively high compared to previous years. The soaring of NPLs in South Asian countries enforces a massive burden on commercial banks' financial position (mainly banks' lending process effected). The massive increase in NPL is observed after the global financial crisis (2007–2008). According to Masood and Ashraf (2012), the credit risk high ratio of NPLs is the main reason for most of the financial crisis because NPLs alarmingly high during the Asian currency crisis in 1997 and subprime crises in 2007, and some loans are declared bad debts. The alarmingly high ratio of NPL resulted in an increasing depression in the financial market, unemployment and a slowdown of the intermediary process of banks (see Figure 1).

The World Bank statistics of different regions show that NPLs exist in almost all regions. Still, the ratio of NPLs is relatively high in the South Asian area compared to other regions. Therefore, the study is conducted in South Asia. Two proxies of credit risk are used in this study: NPLs and capital adequacy ratio (CAR). Moreover, the study also incorporates bank-specific factors to increase FP.

Various studies (Louzis *et al.*, 2012; Ofori-Abebrese *et al.*, 2016; Hassan *et al.*, 2019) are conducted to address the issue, but literature shows that the results of these studies are inconclusive and also ignore the most important region of South Asia. Therefore, the study objective is to investigate that credit risk and banks specific factors affect FP of commercial



Source(s): World Bank Statistics

Figure 1.
NPLs-continent wise

banks in Asia or not? We have selected two from South Asia, Pakistan and India, as sample countries. In 2019, the NPLs were 13% and 10% in Pakistan and India, respectively. This ratio is relatively high as compared to the other countries of the world. Due to these reasons, we have mainly selected India and Pakistan from South Asian countries (Siddique *et al.*, 2020). The present study uses secondary panel data set of 19 commercial banks from 2009 to 2018.

Two serious threats may exist: The first is autocorrelation and the second is endogeneity. If the data do not meet these CLRM assumptions, then the regression results are not best linear unbiased prediction (BLUE) (Sekaran, 2006; Kusietal, 2017). And in this situation, apply pooled regression is applied, and then the results were biased because the coefficient results cannot give accurate meaning. After all, pool regression ignores year and cross section-wise variation. Therefore, in this study, an instrumental regression can be used that handle all these issues. Generalized method of moments (GMM) is used to analyze the data to overcome endogeneity. Our study is unique by addressing the autocorrelation and endogeneity issue at a time. Our study results show that credit risk measure NPLs decrease the FP due to having negative relation, while CAR has a positive relation with South Asian banks' FP. The remainder of the research study is organized as follows: Section 2 consists of a detailed literature review; Section 3 consists of data and methodology. Sections 4 contains information about finding and suggestions. Finally, Section 5 discusses the conclusion.

Literature review

The Literature Review has mainly divided into two crucial sections; First part consists of the literature review related to credit risk and FP. The other part is related to the literature review of bank-specific variables and FP. In the hypothesis development, we have used commercial banks' profitability that represents the FP of commercial banks.

Credit risk and financial performance. While operating in the banking industry, three categories of risks that the bank has to face include environmental, financial and operational risks. Banks generate their incomes by issuing a massive amount of credit to borrowers. Still, this activity involves a significant amount of credit risk. When borrowers of the banking sector default cannot meet their debt obligation on time, it is called credit risk (Accornero *et al.*, 2018). When there is a large amount of loan defaulter, then it adversely affects the profitability of the banking sector. Berger and DeYoung (1997) pointed out that the absence of effective credit risk management would lead to the incidence of banking turmoil and even the financial crisis. Siddique *et al.* (2020) explain that NPLs are related to information asymmetric theory, principal agency theory and credit default theory. When asymmetric information unequal distribution of information of high NPLs is spread, there is a chance that banks or financial declared bankrupt. According to Pickson and Opore (2016), the principal agency must separate corporate ownership from managerial interest. Because each management has its interest, they want more prestige, pay increment and want the stock options for management. Effective management of credit risk or nonperformance exposure in the banking sectors increases profitability. It enhances the development of banking sectors by adequate allotment of working capital in the economy (Ghosh, 2015).

There is a growing literature (Louzis *et al.*, 2012) on credit risk and its empirical relationship with the monetary benefits of the banking sector. Ekinci and Poyra (2019) investigate the relationship between credit risk and profitability of deposit banks in Turkey. The data sample used 26 commercial banks from 2005 to 2017. All data of this study are secondary and collected from annual reports of commercial Turkey banks. The proxies of profitability were taken as return on equity (ROE) and return on the asset (ROA), while NPLs of commercial banks were used as a proxy to measure credit risk. The research paper reveals that credit risk and ROA are negatively correlated as well as the relation between credit risk and ROE is also significantly negative relation. Therefore, the study suggests that the

Turkey government tightly monitors and controls the alarmingly soaring ratio of NPLs. Upper management introduced some new measures to trim the credit risk.

Oluwafemi *et al.* (2013) conducted their study to check the relationship between credit risk and monetary gain of the banking sector and used NPL and CAR as indicators of credit risk. Blum and Hellwig (1995) pointed out that CAR are the amounts kept by the banking sector that protect them from insolvency risk, while NPLs is the amount not being paid even after the due date of 90 days has been passed. And after performing the analysis, results imply that both factors, CAR and NPL, affect the ROE, but the CAR is less significant than NPL. Adebayo *et al.* (2011) conduct their Ghana region of Brong-Ahafo on the emerging problem of credit risk management and investigate the nature of the relationship with the profitability of the rural banks. NPLs are used as the proxy of credit risk, while ROE and ROA calculated proxies to quantify the FP. The study results show a significant positive interrelation between NPLs and bank FP as the loan losses increase the performance and profitability, showing an increasing trend. Some other researches (Adebayo *et al.*, 2011; Oluwafemi *et al.*, 2013; Chimkono *et al.*, 2016) also conduct their studies to examine the nature of linkages between credit risk CR and FP of banks; a chunk of studies found a negative relationship between credit risk and banks' financial performing, while others found positive and insignificant relationship between both factors. Therefore, the situation is not clear. The present study uses this phenomenon and NPLs. The capital adequacy ratio is used as two proxies of credit risk and checks its relationship with South Asia's financial-performing banking sector. Based on the abovementioned discussion, our study develops these two hypotheses:

- H1. There is a negative and significant relationship between NPLs and commercial banks' FP.
- H2. There is a positive and significant relationship between capital adequacy ratio and commercial banks' FP.

Bank-specific variables and financial performance. Bank-specific variables or internal factors are the product of business activity. Diversifiable risk is associated with these factors (Louzis *et al.*, 2012) and can be reduced by efficient management. This risk is controllable compared to an external factor, which cannot be diversified because this risk is market risk (Ghosh, 2015; Rachman *et al.*, 2018). If a firm can manage its internal factor effectively, then the firm can be high profitability, while, on the other hand, these factors are mismanaged. It would adversely affect the firm's balance sheet and income statement (Ofori-Abebrese *et al.*, 2016). Different authors (Akhtar *et al.*, 2011; Louzis *et al.*, 2012; Chimkono *et al.*, 2016; Hamza, 2017) discuss different bank-specific variables and firm performance in their studies. The bank-specific variables used in this study are cost-efficiency ratio (CER), average lending rate (ALR) and liquidity ratio (LR). Aspal *et al.* (2019) used two types of factors (macro and bank-specific factors) and inspected their connection with the FP of the commercial bank in India. Gross domestic product (GDP) and inflation are used as proxies of macroeconomic factors.

In contrast, a bank-specific variables' proxy includes capital adequacy ratio, asset quality, management efficiency, liquidity and earnings quality. Data of 20 private banks have been used from 2008 to 2014. The panel data pointed out that one macroeconomic factor is significant (GDP), and another factor (Inflation) is insignificant. All bank's specific factors (earning quality, asset quality, management efficiency and liquidity) significantly affect the FP except the CAR (insignificant). Hasanov *et al.* (2018) conducted their study to explore the nature of the interrelation between bank-specific (BS) and macroeconomic determinants with the banking performance of Azerbaijan (oil-dependent economy). The study used the GMM to analyze the panel data set. The results show that bank loans, size, capital and some macro factors (inflation, oil prices) were positive and significantly interconnection with the FP of

banks; on the other hand, liquidity risk, deposits and exchange rates are significantly affected negatively bonded with the FP.

The CER is the ratio of how to efficiently and effectively control the operating cost of a bank. Berger and DeYoung (1997) conduct their study on problem loans and cost-efficiency in commercial banks and make four hypotheses, and one hypothesis is related to bad management (cost-efficiency). When management has less or no control over their operation and cannot perform in their day-to-day operation, the result of all inefficiencies that their loan portfolio crease and CER also increase. Studies (Berger and DeYoung, 1997; Chimkono *et al.*, 2016; Ghosh, 2015) were conducted to determine the relationship between the CER and FP. Some studies pointed out a significant negative relationship between the CER and FP. At the same time, some other researchers conclude a positive or insignificant relationship between the CER and FP. Therefore, there is much contradictory situation that exists. Based on the literature of CER and FP, the following hypothesis is developed:

H3. There is a negative and significant relationship between the CER and commercial banks' FP.

Lending is considered the heart of the banking sector, so commercial banks mainly engage in lending and earn their profits. Monetary authorities also use the lending rate as a tool to control the economy of a country (Chimkono *et al.*, 2016). Suppose banks or monetary authorities increase lending rates, then in order to compensate for this high lending rate. In that case, investors usually invest in a high-risk project, which increased the chance of default (Hamza, 2017). A chunk of empirical studies tested to investigate the tie-up between the ALR. Adebayo *et al.* (2011) organized the research paper in Nigeria from 2000 to 2010 to ascertain the linkages between bank lending rate and performance. The result of the data shows that in the short and as well as in the long run, there is a significant positive relationship between the lending rate of a bank and the performance of a bank. Likewise, some other studies (Chimkono *et al.*, 2016; Hamza, 2017) also pointed out a positive relationship between the lending rate of a bank and the performance of a bank; on the handsome, other studies pointed out a negative or insignificant relationship between the lending rate and firm performance, so the situation is still not clear. After examining previous literature, a hypothesis is developed between the ALR and FP:

H4. There is a positive and significant relationship between the ALR and commercial banks' FP.

Francis *et al.* (2015) define liquidity in their study and, according to the liquidity of an asset, determined by how quickly this asset can be converted or transferred into cash. Liquidity is used to fulfill the short-term liabilities rather than the long term (Siddique *et al.*, 2020; Raphael, 2013). Adebayo *et al.* (2011) mentioned in their study that when banks are unable to pay the required amount to their customers, it is considered bank failure. Sometimes liquidity risk affects the whole financial system of a country. Different studies are conducted on the issue of liquidity and performance, but different studies show different results. FP and liquidity, on the other hand, a chunk of studies (Francis *et al.*, 2015; Hamza, 2017) revealed significant negative tie-up between liquidity and FP, while some other studies pointed out that there is no significant relationship between liquidity and FP. Therefore, the studies show a contradictory result, so the current study takes the bank-specific measures (LR, ALR study and CER) and checks its interconnection with commercial banks' FP.

Different other studies conducted used macroeconomic factors (Accornero *et al.*, 2018; Hamza, 2017; Ghosh, 2015), but the current study is based on bank-specific factors (unsystematic risk) because this risk could be controlled by effective management risk and improve FP. The study used few important bank-specific variables (LR, ALR study and CER),

as well as NPLs and capital adequacy and check their relationship with the FP of commercial banks. The LR and FP hypothesis are given as:

H5. There is a positive and significant relationship between the LR and commercial banks' FP.

Data and methodology

Our current study has one problem variable, financial performance (FP), while regressors variables are credit risk and bank-specific variables. Our model is consistent with [Chimkono et al. \(2016\)](#), where ROA and ROE will be used as a measure of FP, while credit risk will be measured by NPL ratio, CAR and three specific variables: CER, LR and ALR.

Various studies ([Hamza, 2017](#); [Belas, 2018](#)) emphasize some macro and micro variables that need to be controlled when measuring FP because these factors are the influential factors. Three control variables: size of the bank, age of the banks and Inflation are used in this study and shown as yes in the tables. We have chosen these three control and most relevant variables because these variables represent both micro and economic situations. Data have been collected from two South Asian countries Pakistan and India. The nature of data is panel data and the number of banks from Pakistan (10 commercial banks) and India (9 commercial banks) is 19. The data have been collected from bank financial statements throughout 2009 to 2018, so the data of this study are a panel in nature. The final number of observations is 190 (19*10 = 190) for the analysis of this study (see [Table 1](#)).

Operational definition

Credit risk. The probability of lenders being the default, high credit risk higher FP of banks ([Louzis et al., 2012](#)).

Bank-specific factors. Bank-specific factors are those which are under the control of the management of commercial banks ([Chimkono et al., 2016](#)).

Nonperforming loans. A loan becomes nonperforming when the duration of the loan has been passed, and after that duration, banks 90 days are passed unable to receive the principal amount of loan and interest payment ([Hamza, 2017](#)).

		Name of variable	Symbol	Measurement
Dependent variable	Financial performance	Return on asset	ROA	$\frac{\text{Net income}}{\text{Total assets}}$
		Return on equity	ROE	$\frac{\text{Net income}}{\text{Total common equity}}$
Independent variable	Credit risk	Nonperforming loans	NPLs	$\frac{\text{Total nonperforming loan}}{\text{Total loans}}$
		Capital adequacy ratio	CAR	$\frac{\text{Risk weighted assets}}{\text{Total equity}}$
	Bank-specific factors	Cost-efficiency ratio	CER	$\frac{\text{Total operating cost}}{\text{Total revenue}}$
		Average lending rate	ALR	$\frac{\text{Net interest income}}{\text{Total assets}}$
Control variables		Liquidity ratio	LR	$\frac{\text{Total loans}}{\text{Total deposits}}$
		Bank size	BZ	Log (total assets)
		Inflation	Inflation	Annual inflation rate declared by word bank
		Age	Age	Age of commercial banks

Table 1. Summary of explanatory variables and dependent variables

Methodology

The current study investigates the interrelationship between credit risk, bank-specific factors and FP. Panel data set is used in our study, and two serious threats usually faced when using panel data set: (1) autocorrelation and (2) endogeneity. For this purpose, a GMM can be used. GMM model has many advantages on simple ordinary least square regression. And when in any study GMM model applies, it allows by adding the fixed effect model; this model can be able to tackle the problem of heterogeneity, and it also removes the problem of endogeneity by introducing some instrumental variables.

Model specification

The regression model is as follows:

$$\begin{aligned} \text{ROA}_{it} = & \gamma_0 + \gamma_1 \text{NPLS}_{it} + \gamma_2 \text{CER}_{it} + \gamma_3 \text{CAR}_{it} + \gamma_4 \text{ALR}_{it} + \gamma_5 \text{LR}_{it} + \gamma_6 \text{SIZE}_{it} + \gamma_7 \text{AGE}_{it} \\ & + \gamma_8 \text{INFR}_{it} + \varepsilon_{it} \end{aligned} \quad 3.1(a)$$

$$\begin{aligned} \text{ROE}_{it} = & \gamma_0 + \gamma_1 \text{NPLS}_{it} + \gamma_2 \text{CER}_{it} + \gamma_3 \text{CAR}_{it} + \gamma_4 \text{ALR}_{it} + \gamma_5 \text{LR}_{it} + \gamma_6 \text{SIZE}_{it} + \gamma_7 \text{AGE}_{it} \\ & + \gamma_8 \text{INFR}_{it} + \varepsilon_{it} \end{aligned} \quad 3.1(b)$$

where

γ_0 = intercept; γ_1 - γ_8 = estimated coefficient of independent variables and control variables.

ε_{it} represents error terms for those variables that are omitted or added intentionally/unintentionally.

According to [Lassoued \(2018\)](#), panel data regression has two significant problems: autocorrelation and endogeneity, and this problem is existed due to the fixed effect. Therefore, our study checked the basic two assumptions of ordinary least squares.

Testing for autocorrelation

The fifth assumption of CLRM is that data should be free from autocorrelation. [Sekaran \(2006\)](#) pointed out the relationship between two different error terms should be zero; it means that there is no autocorrelation between error terms. There are different tests for testing autocorrelation, but the Wooldridge test is used in the present paper to test the autocorrelation.

[Table 2](#) shows that the p -value of the Wooldridge test result is zero, so it means that all p -values are less than 0.05. It means that reject the null hypothesis. And the null hypothesis is that our data have no autocorrelation, but the results show that our data have autocorrelation problems.

Testing for endogeneity

The seventh assumption of CLRM is that data have no issue of endogeneity. [Sekaran \(2006\)](#) found that the relationship between the error term and explanatory or independent variable should be zero. If this relationship is not zero, then the problem of endogeneity exists. [Brooks \(2014\)](#) pointed out that Hausman test results probabilities can be used to test the endogeneity, and the null hypothesis of this test is that errors are uncorrelated. He also pointed out that if

the probabilities are more than 0.10, then accept the null hypothesis. It means that there is no problem of endogeneity, and if the values are less than 0.1, then our data have the problem of endogeneity. Appendix 1 shows that some values of the Hausman test are less than 0.10, so it means that data have the problem of endogeneity. Our panel data results prove that our data have the problem of autocorrelation and endogeneity. Some CLRM model assumptions are not met, so ordinary least square regression results are not BLUE. And GMM model can be applied to any study because this model can be able to tackle the problem of autocorrelation, and it also removes the problem of endogeneity by introducing some instrumental variables.

Findings and discussion

The present research paper provides empirical evidence on the interconnection between credit risk and bank-specific/internal factors on FP commercial banks. To analyze the data set, first, the study applies the descriptive analysis to identify the big picture of the data, then the correlation section and at the end, regression results are discussed. Table 3 presents the descriptive statistics of the all variables used in the study: credit risk indicator which are the ratio of NPL, CAR; indicators of bank-specific factors (CER, ALR, LR); some control variables SIZE, AGE, INF and the measure of FP: ROA, ROE. The mean value of ROA and ROE is 0.986 and 7.964 with a standard deviation of 1.905 and 39.175, respectively, which shows that ROE has much higher variation than ROA. The standard deviation of NPL is 9.659, which is double that of CAR, whose standard deviation is 4.183 among all bank-specific factors (see Table 4).

Factor (CER, ALR, LR) LR has high dispersion (14.177) because there is a remarkable difference between minimum 25.027 and maximum value (107.179) of LR. ROA has 0.986 with a range between 10.408 and -6.234 with a standard deviation of 1.905, and it shows that there is a low level of dispersion in developed countries. The dispersion of ROE 39.175 is highest among all other variables, which means that some outliers exist in the ROE variable.

Correlation analysis is used to check the linear relationship between the two explanatory variables (Brooks, 2014). If the sample size of any approaches to 100, greater than 100 and the correlation coefficient is 0.20, then the correlation is significant at 5% (Lassoued, 2018). Most of the variables in the current study are significant at 5%.NPLs, and CER loans are negatively

Wooldridge test for autocorrelation in panel data in developing countries

Model ROA	Model ROE
$F = 111.092$	$F = 7.447$
Prob > $F = 0.0000$	Prob > $F = 0.0138$

Table 2.
Results for autocorrelation for South Asia countries

Variables	Mean	Maximum	Minimum	Std. dev.	Observations
ROA	0.986	10.408	-6.234	1.905	190
ROE	7.964	100.158	-268.759	39.175	190
NPL	7.206	64.058	0.271	9.659	190
CAR	13.885	39.130	1.050	4.183	190
CER	27.920	68.696	13.050	9.808	190
ALR	8.723	14.701	5.542	1.615	190
LR	68.016	107.179	25.027	14.177	190
YES	3.899	5.008	2.318	0.589	190
YES	49.131	111	5	34.171	190
YES	9.449	20.92	2.540	3.891	190

Table 3.
Descriptive statistics

correlated with almost all independent variables, which supports the literature point that NPLs and CER are negatively associated with FP and bank-specific factors. The negative correlation of NPLs with ROE is loan -0.378 , and this correlation is high as compared to other countries. At the same time, all bank-specific factors, CER, ALR and LR are mostly positively correlated with most of the other, almost all dependent and independent variables, while AGE and INF are mostly negatively correlated with the other variables of the study.

Regression results and discussion

Tables 5 and 6 have shown the regression results of pooled regression and GMM models. Tables include all independent, control variable coefficients, t -statistics, standard error and probability values. Additionally, tables have the values of R^2 , adjusted R^2 and Durbin Watson statistics. The adjusted R^2 under pooled regression are 0.250 and 0.231 in both models (ROA and ROE). While adjusted R^2 under the GMM are 0.358 and 0.249 in both models ROA and ROE.

Table 4.
Correlation figures

Variable	ROA	ROE	NPL	CAR	CER	LR	ALR	SIZE	AGE	INF
ROA	1									
ROE	0.757	1								
NPL	-0.225	-0.378	1							
CAR	0.184	0.156	-0.284	1						
CER	-0.170	-0.195	0.058	0.407	1					
LR	0.026	0.010	-0.305	-0.121	-0.402	1				
ALR	0.140	0.020	0.143	0.091	0.133	-0.237	1			
YES	0.298	0.305	-0.213	-0.025	-0.335	0.457	-0.441	1		
YES	-0.007	0.019	-0.182	-0.063	-0.310	0.213	-0.197	0.099	1	
YES	-0.013	-0.171	0.163	-0.019	0.024	0.152	0.520	-0.162	-0.135	1

Table 5.
ROA model (pooled regression and fixed effect GMM result)

Variable	Pooled regression				Generalized method of moments			
	Coefficient	Std. Error	t -Statistic	Prob.	Coefficient	Std. Error	t -Statistic	Prob.
C	-5.449	1.754	-3.105	0.002*	-7.098	1.959	-3.621	0.000
NPL	-0.034	0.014	-2.434	0.015**	-0.032	0.015	-2.088	0.038**
CAR	0.080	0.033	2.417	0.016**	0.085	0.036	2.329	0.021**
CER	-0.043	0.015	-2.824	0.005*	-0.048	0.016	-2.972	0.003*
ALR	0.409	0.099	4.131	0.000*	0.492	0.112	4.392	0.000*
LR	-0.025	0.011	-2.296	0.022**	-0.027	0.013	-2.125	0.035**
YES	1.371	0.254	5.383	0.000*	1.649	0.292	5.645	0.000*
YES	-0.002	0.003	-0.588	0.557	-0.000	0.004	-0.026	0.978
YES	-0.031	0.039	-0.805	0.421	-0.032	0.061	-0.525	0.599
R^2	0.282				0.372			
Adjusted R^2	0.250				0.358			
S.E. of regression	1.650				1.672			
Durbin-Watson stat	1.834				1.980			
Hause test (χ^2)					50.960			
P -value(χ^2)					0.000			

Note(s): *Indicates significance at 1% level, ** Indicates significance at 5% level, *** Indicates significance at the 10% level

Pooled regression					Generalized method of moments				Effect of credit risk management
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.	
C	-16.229	39.885	-0.407	0.685	-26.740	44.139	-0.606	0.546	191
NPL	-1.418	0.327	-4.337	0.000*	-1.379	0.354	-3.893	0.000*	
CAR	1.261	0.713	1.769	0.079***	1.315	0.774	1.699	0.091***	
CER	-1.035	0.350	-2.953	0.004*	-1.032	0.375	-2.754	0.007*	
LR	-0.464	0.232	-2.000	0.047**	-0.463	0.262	-1.768	0.079***	
ALR	3.981	2.037	1.954	0.052***	4.331	2.238	1.936	0.055***	
YES	16.309	6.355	2.566	0.011**	18.481	7.001	2.640	0.009*	
YES	-0.113	0.105	-1.082	0.281	-0.097	0.118	-0.824	0.411	
YES	-1.623	0.734	-2.211	0.028**	-1.867	0.857	-2.178	0.031**	
R ²	0.234				0.265				
Adjusted R ²	0.231				0.249				
S.E. of regression	30.442				29.378				
Durbin-Watson stat	1.340				1.511				
Hause test (χ^2)					18.183				
P-value (χ^2)					0.000				

Note(s): *Indicates significance at 1% level, ** Indicates significance at 5% level, *** Indicates significance at the 10% level

Table 6. ROE model (pooled regression and fixed effect GMM result)

It means the GMM more and better explains our model than pooled regression. Moreover, we also apply a Hausman test on both models. The *p*-value of both models is less than 0.05, so our data have the problem of endogeneity null hypothesis. To eliminate the endogeneity issue, the GMM coefficient was measured.

NPL has a significant and negative measure of FP: ROA and ROE. In contrast, CAR has significant and positive with all proxies of FP: ROE and ROA, which supports H1 and H2 of the paper. Our finding is consistent with Masood and Ashraf (2012) who conducted their study on credit risk and FP and found a significant negative relationship between NPL and FP, so NPLs hinder banks' profitability. Therefore, NPLs affect the whole financial system of a country especially in developing countries. The findings of CAR matched with Accornero *et al.*'s (2018) study and pointed out that CAR has a significantly positive link with FP. CER has a significant negative relationship with ROA and ROE, which is consistent with the study of Francis *et al.* (2015) who pointed out a significant negative relationship between CER and ROE. Therefore, banks need to adapt strategies to control these costs and tried to increase their profitability. ALR had a significant and positive relationship with both measures of FP. ALR is significant at 1% with ROA and 10% significant with ROE. The result is supported by the study of Chimkono *et al.* (2016) who found a positive relationship between the ALR and FP of commercial banks.

LR has a significantly negative relationship with ROA and ROE. This finding is consistent with Siddique *et al.* (2020) who pointed out a significant negative relationship between LR and ROE; the more liquidity is maintained, the lesser the profitability level. In short, most of the independent variables are significant at 5% and 1%, and control variables are also significant in both models size of the bank and inflation except AGE. This result is matched with Ghenimi *et al.*'s (2017) findings that prove that total assets or investment increment are directly proportional to the FP. Both variables of credit risk NPL and CAR are significant with the FP of commercial banks in both models. Banks try to reduce bank-specific factors risk, and by doing so, ultimately the amount of bad debt decreased, and another benefit is that it also reduces the amount of loan loss provision.

Conclusion

The current study empirically investigates the causal interrelation between credit risk, bank-specific factors and FP of commercial banks in two South Asian countries (Pakistan and India). The study's finding suggests that managers in South Asian countries should be focused on increasing capital adequacy to enhance the monetary gain (FP) while for the contraction of NPLs by implementing modern techniques and strategies for credit risk (NPLs) management. One indicator of the bank-specific variable (ALR) has a significant and positive interrelation with the FP of commercial banks. In contrast, CER and LR have a significant and positive relationship with the FP of commercial banks of South Asia. Control variables of the study (size of the bank and inflation) are also significant in both models except AGE. There are several policy implications that commercial banks of South Asian countries should be followed. NPLs are soaring due to the following reasons: less supervision and monitoring of customers, the problem of the market and lack of customer knowledge related to loans. Bank management should be efficient in judging that their customers have viable means of repayment or not. Moreover, banks can offer expert opinion to the professional loan take on feasible techniques of efficiently endow the borrowing to secure the required return on total firms investment is acquired. Liquidity position should be well maintained so that even in a high competition environment, the commercial can survive in that environment.

The scope of the study is only limited to commercial banks, but this model can also be applied to Islamic banks. And future researchers can also apply this model to a comparison-based study of commercial and Islamic banks. Data of this study have been collected only from 19 banks; future research can also increase the number of banks and increase the number of years to conduct their study. And if the number of banks and the number of the year increased, the results are a more reliable and accurate representation of the population. The data of this study have been taken only from two countries of South Asia, but this study can be extended by adding more countries in Asia. When we add the number of countries, the results are a better and accurate representation of developing and developed countries of Asia. This model can also be applied to some other continents because the macro environment and bank-specific factors are pretty different from continent to continent.

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Appendix 1
Endogeneity

South Asian countries (ROA)

Variable	Fixed	Random	Prob
NPLs	-0.066068	-0.034634	0.0046
ALR	0.222311	0.215984	0.9208
CAR	0.001613	0.068108	0.0002
CER	-0.027827	-0.030749	0.8033
LR	0.014278	-0.001034	0.0021
SG	0.011874	0.011150	0.7116
SIZE	-4.446678	0.339918	0.0000
INFLATION	-0.055072	-0.053349	0.8938
AGE	0.273576	-0.002688	0.0000

South Asian countries (ROE)

Variable	Fixed	Random	Prob.
NPLs	-1.381440	-0.918537	0.9468
ALR	-1.535941	0.727034	0.1002
CAR	0.008182	-0.096010	0.6395
CER	-0.328610	-0.232542	0.5979
LR	-0.012691	-0.067185	0.0082
SG	0.029615	0.088314	0.5599
SIZE	-12.082609	0.382527	0.1095
INFL	-0.390149	0.087808	0.8251
AGE	-0.687654	-0.007677	0.2538

Appendix 2

Extra tables and figures in the Google drop box and available at: <https://www.dropbox.com/sh/dro0gkowf3t542r/AAC3QQ5IKQTpLdke7UNxRUEea?dl=0>

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